nanomaterials

Supplementary materials

Basic Medium Heterogeneous Solution Synthesis of α-MnO_2 Nanoflakes as an Anode or Cathode in half Cell Configuration (vs Lithium) of Li-ion Batteries

Kyungho Kim,[a] Geoffrey Daniel,[b] Vadim G. Kessler,[c] Gulaim A Seisenbaeva, *[c] Vilas G. Pol*[d]

[a] *Materials Science and Engineering, Purdue University - West Lafayette, West Lafayette, IN, USA*

[b] *Department of Molecular Sciences, Swedish University of Agricultural Sciences, Box 7015, SE-75007 Uppsala, Sweden*

[c] *Department of Forest Products, Swedish University of Agricultural Sciences, Box , SE-75007 Uppsala, Sweden*

[d] *Davidson School of Chemical Engineering, Purdue University, West Lafayette, 47906, IN, USA*

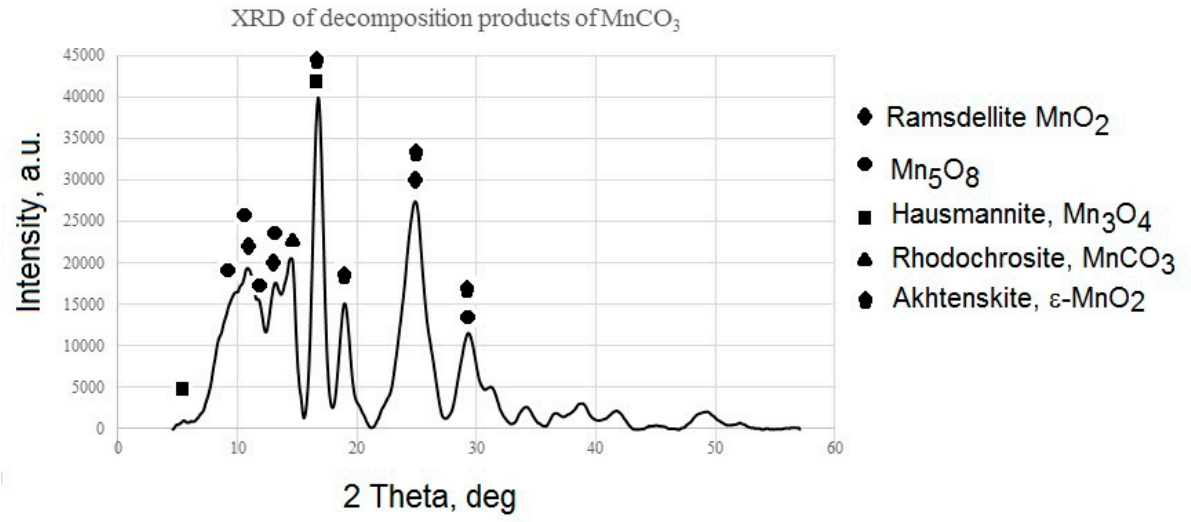


Figure S1. XRD pattern of decomposition products of $MnCO_3$ with characteristic peaks for Ramsdellite MnO_2 (ICPDS Card 82-2169), Mn_5O_8 (39-1218), Hausmannite Mn_3O_4 (80-382), Akhtenskite ε-MnO_2 (30-0820) and Rhodochrosite $MnCO_3$ (86-0173) marked in the image.

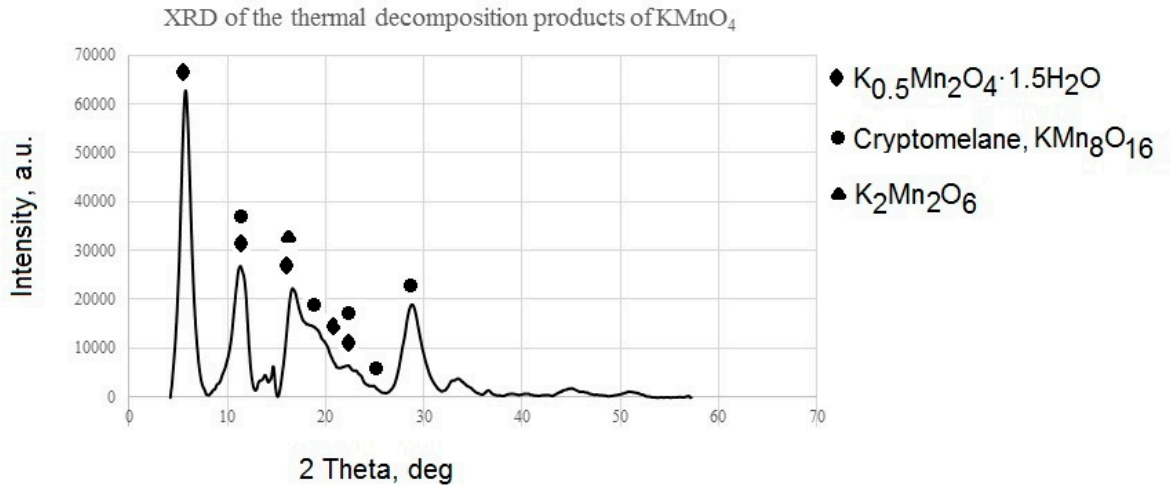


Figure S2. XRD of the material obtained by heat-treatment of the precipitate from the reaction $KMnO_4$ with NH_3 in aqueous medium at 600°C in 2h in air with characteristic peaks indicated for $K_{0.5}Mn_2O_4 \cdot 1.5H_2O$ (JCPDS Card 42-1317), Crypromelane KMn_8O_{16} (34-0168) and $K_6Mn_2O_6$ (ICDD PDF 01-070-1271).

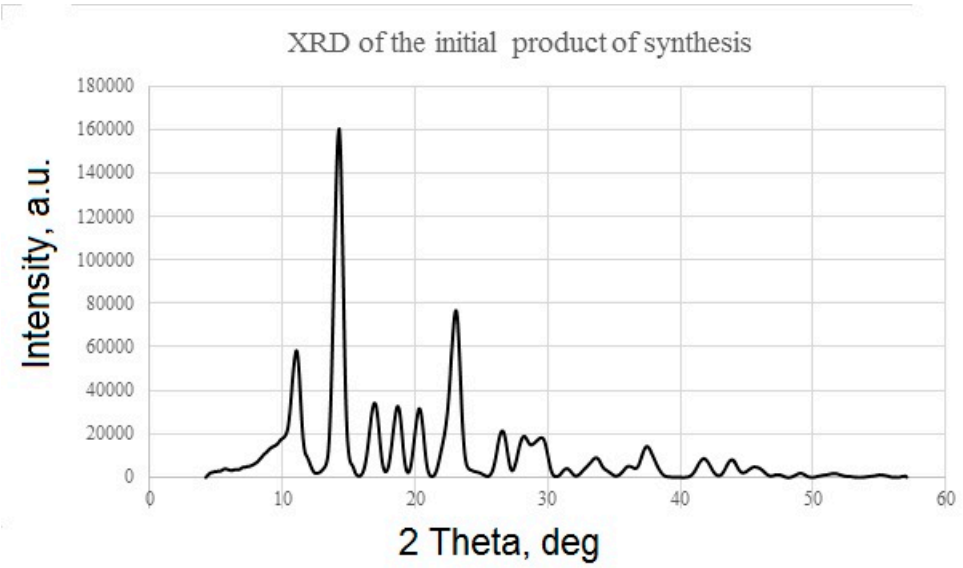


Figure S3. XRD of the initial product of solution synthesis featuring the pure $MnCO_3$ phase ICPDS Card No. 86-0173.

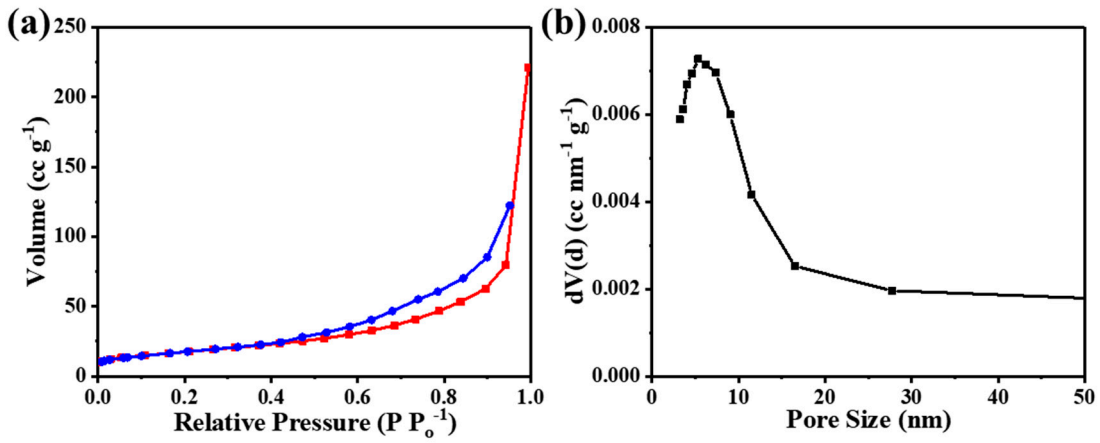


Figure S4. BET analysis of (a) N_2 absorption isotherm and (b) pore size distribution profile of prepared α-MnO_2 nanomaterial.

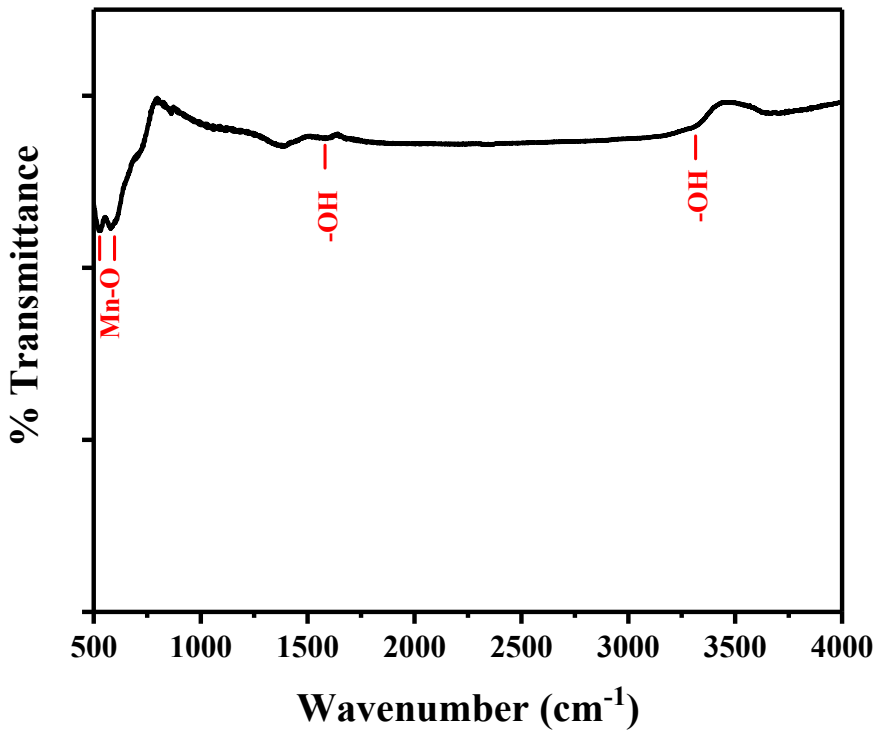
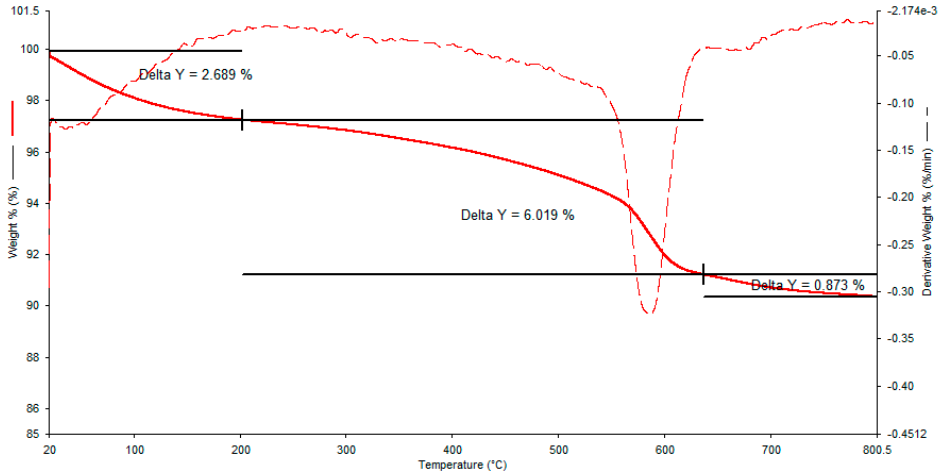


Figure S5. FTIR analysis for produced α-MnO_2 nanomaterial.

A



B

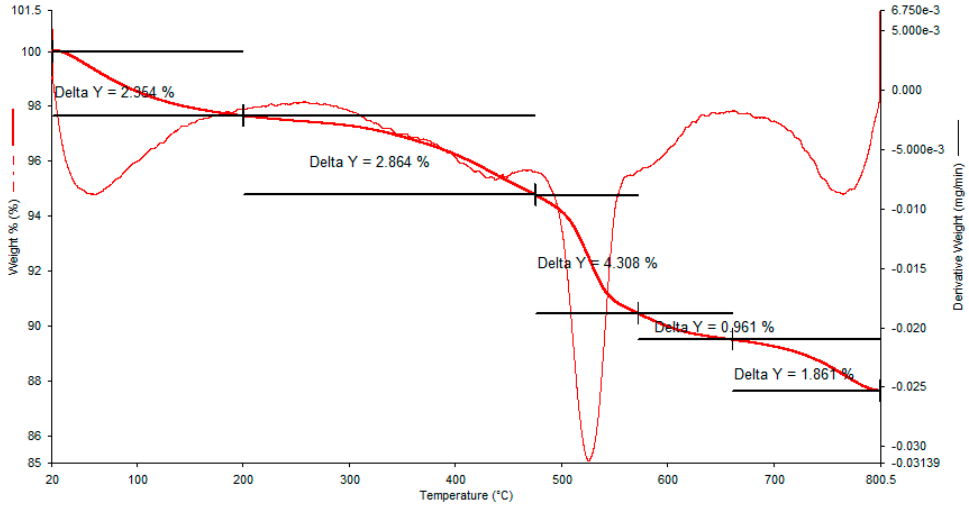


Figure S6. TGA (solid line) and DTG (dashed line) analysis of produced α-MnO_2 nanomaterial in the air (A) and in the nitrogen (B) atmosphere.